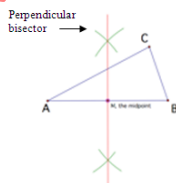
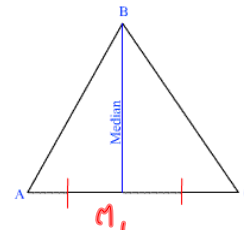


## (2.7) Using Coordinates to Solve Problems

Recall:

Median line running from midpoint to opposite vertexAltitude height opposite vertex to  $90^\circ$  to the basePerpendicular bisector line which splits a line in two equal portions and intersects at  $90^\circ$ To find the equation of a **median**:

- Find the midpoint of the opposite side
- Use the vertex and midpoint to determine the slope
- Use either point to determine the y-intercept
- Put information together into  $y = mx + b$

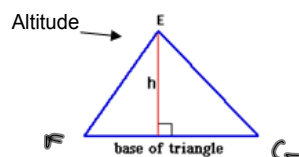


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To find the equation of an **altitude**:

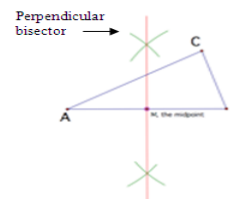
- Find the slope of the opposite side using the vertices
- Take the negative reciprocal of the slope
- Use the vertex containing the altitude to determine the y-intercept
- Put information together into  $y = mx + b$



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To find the equation of a **perpendicular bisector**:

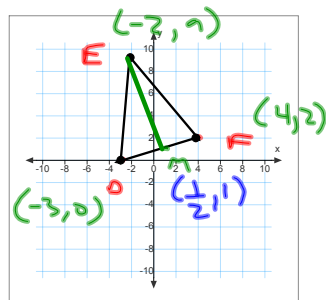
- Find the slope of the opposite side
- Take the negative reciprocal of the slope
- Find the midpoint of the opposite side
- Use the midpoint to determine the y-intercept
- Put information together into  $y = mx + b$



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## Example 1:

Graph the triangle defined by D(-3,0), E(-2,9) and F(4,2).



Calculate the length of the median from vertex E  
 Calculate the equation of the median from vertex E

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$$\begin{aligned}
 &D(-3,0) \quad F(4,2) \\
 &\quad x_1, y_1 \quad x_2, y_2 \\
 &\text{Midpoint} \\
 &m \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \\
 &\left( \frac{-3 + 4}{2}, \frac{0 + 2}{2} \right) \\
 &\quad + \frac{1}{2}, \frac{2}{2} \\
 &\left( +\frac{1}{2}, 1 \right) \text{Midpoint}_{DF}
 \end{aligned}$$

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Distance  $M(\frac{1}{2}, 1)$   $E(-2, 9)$   
 $x_1, y_1$   $x_2, y_2$

$$D = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$$

$$= \sqrt{(9 - 1)^2 + (-2 - 0.5)^2}$$

$$= \sqrt{(8)^2 + (-2.5)^2}$$

$$= \sqrt{64 + 6.25}$$

$$= \sqrt{70.25}$$

$$= 8.4$$

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Eqn of the Median Line

$$y = mx + b$$

$M(0.5, 1)$   $E(-2, 9)$   
 $x_1, y_1$   $x_2, y_2$

$$m = \frac{9 - 1}{-2 - 0.5}$$

$$= \frac{8}{-2.5}$$

$$= -3.2$$

$$y = -3.2x + b$$

$$9 = -3.2(-2) + b$$

$$9 = 6.4 + b$$

$$9 - 6.4 = b$$

$$2.6 = b$$

$$y = -3.2x + 2.6$$

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Homework

p.120-121  
 q. 6,7 & 10

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